

BIOL/CHEM 327

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Course Information

- Office Hours: TBD (will be posted on BlackBoard site)
- Class meetings:
 - M,W&F at 11:45-12:35 in HOSCI 202
 - THURS at 10:20 -11:10am in HOSCI 202 or 209
- Laboratory on THURS at 12:45-3:45 or FRI at 1:15-4:15 in HOSCI 209

Course Goals

- To understand the chemical basis of the structure and function of the four main groups of biological molecules responsible for cellular function
- To become proficient in the visual rendering of biological macromolecules using common biochemical visualization programs to understand how structure informs function
- To gain hands-on experience with (and understand the basic theory behind) some of the laboratory methods used to isolate and investigate these biological molecules
- To become familiar with a variety of data bases that contain information about the structure and function of these biological molecules (bioinformatics)
- To gain more experience in scientific writing
- To develop more problem-solving and critical thinking in class and in the laboratory

Required and Suggested Materials

- Required Text: Lehninger's Principles of Biochemistry 5th Edition, ISBN: 0-7167-7108-X by David Nelson and Michael Cox. (2008), W.H.Freeman and Company
- Textbook website (free registration!) at <http://bcs.whfreeman.com/lehninger5e/>
- Recommended "Study Guide and Solutions Manual" to accompany the 5th ed (can be purchased in the bookstore or a copy is in the Chemistry Periodical Room for your access)
- A USB memory stick to save copies of lab data and other pertinent electronic course files

Black Board Web Site

Throughout the semester announcements, laboratory procedures, problem sets, answer keys, pertinent links, reminders and other material will be posted to the course blackboard page. Please access this page early and often!

Attendance Policy

Your presence is welcome and expected in all course meetings (class, problem sessions, and laboratories). As a reminder, the college policy on attendance can be found in the student handbook¹. If you anticipate an unavoidable absence (due to an extenuating and documented² circumstance), please notify the instructor as soon as possible, particularly since makeup laboratories or exams are likely not an option.

Academic Honesty Policy

Please be familiar with the college policy on academic honesty³ that applies to this course. In addition, throughout this course, each student may exchange experimental details and data with her/his lab partner and classmates. However, any work submitted in your name is to be your work alone. You may discuss work with others on assignments and labs, but merely copying answers is not acceptable.

¹ <http://www.moravian.edu/studentLife/handbook/academic/academic.html>

² Your instructor will expect documentation from a health professional or academic dean regarding missed exams or laboratories.

³ <http://www.moravian.edu/studentLife/handbook/academic/academic2.html>

BIOL/CHEM 327**Policy on Cell Phone Use**

Please be considerate and turn off your cell phone or other mobile communication device during all course meetings (this includes laboratory!). Please do not make/receive calls during course meetings, or send/receive text messages during course meetings. During quizzes and exams, cell phones must be put away in your backpack (NOT in your pocket) and may not be used in any way or else a grade of zero may be assigned for that quiz/exam at the instructor's discretion.

Grading

Your grade in this course does not depend on the grade of any other student in the class. Instead, your letter grade will be determined by the percentage of total possible points you earn in this course, according to the following scale:

| Percentage | Letter Grade |
|------------|--------------|
| 93-100 | A |
| 90-92 | A- |
| 87-89 | B+ |
| 83-86 | B |
| 80-82 | B- |
| 77-79 | C+ |

| Percentage | Letter Grade |
|------------|--------------|
| 73-76 | C |
| 70-72 | C- |
| 67-69 | D+ |
| 63-66 | D |
| 60-62 | D- |
| < 60 | F |

The total number of possible points in this course is *anticipated* to be as follows:

| | | |
|------|-------------------------------------|--------|
| I. | Exams (3@100pts each) | 300pts |
| II. | Quizzes (~6@10pts each) | 60pts |
| III. | Problem Sets (~8@25pts each) | 200pts |
| IV. | Laboratory | |
| | <i>Performance & Notebook</i> | 130pts |
| | <i>Research Writing (Lab based)</i> | 160pts |
| V. | Final Exam | 150pts |

Total for Course 1000pts

I. Exams: Three 50-minute exams will be given during the semester. These exams are scheduled *in class* on Monday October 5th, November 2nd, and November 23rd. MAKE-UP EXAMS WILL NOT BE GIVEN.

II. Quizzes: Short 10 min quizzes will be given periodically during the semester. These quizzes will cover structures, naming and physical properties of basic building blocks of biomolecules.

III. Problem Sets

Problem sets (~weekly) on material covered in class/lab/problem sessions will be assigned, collected, and graded. Due dates and times for each problem set will be posted on the blackboard course page and clearly indicated on each assignment. Late assignments may be accepted but with a penalty to be decided by the instructor (~10% per day deduction until the key is posted).

V. Final Exam

This exam will be cumulative and given on December 18th in a location to be determined by the registrar.

BIOL/CHEM 327**IV. Laboratory**

Your performance in, analysis of, and scientific writing about laboratory experiments are the basis for a significant portion of your assessment in this course (~30% of your course grade). Since we can only assess your work in lab if you are present, and you will only have writing material for your research assignments if you actually perform the experiments, you should be present for and intellectually active every laboratory meeting of this course. Regarding laboratory absences, please see the attendance policy above.

Part of your lab grade will come from how well you **perform** in lab. Factors affecting this grade include your preparation, safety, work efficiency/technique, and equal task-sharing with your partner in the lab. To prepare for lab each week, please:

- Read each experiment before coming to lab (procedures will be posted to course web site ahead of time)
- Have a general idea of what you will do in lab that day (and in what sequence)
- Look up the MSDS (see blackboard link) for each potentially hazardous chemical that you have not worked with before

Your **electronic laboratory notebook (ELN)** serves many purposes. It is a diary of your time spent in lab, and a complete record of your experimental procedure, data, observations and ideas. Proper documentation of your work could provide the information needed for publishing a paper, writing a thesis, obtaining an award (NOBEL ! \$), getting a raise from your employer (\$), or receiving a patent (\$ \$). While experiments in this lab are unlikely to result in any of the above, we must practice! Please observe the following in your laboratory record-keeping (any of these aspects are fair game for assessment):

- Write legibly with the stylus. Do not erase any mistakes. You may cross-out erroneous entries but they must remain legible. Be sure to explain any such errors.
- Write directly into your notebook. When preparing for lab, reading literature for lab, and during lab, be sure to take notes directly into your notebook. A clear outline format in your notebook, without full sentences, is just fine. Be concise!
- Include references. If you find an important/pertinent piece of information somewhere else (such as in a book, catalogue, journal article, or on a reputable web site) copy the reference information directly into your notebook – Include enough information so you could find it again if you had to!
- Format. The notebook entry for an experiment will generally include:
 - TITLE, DATE, LAB PARTNER.
 - OBJECTIVES/GOALS. Outline the important aspects behind the experiment, its design, and what you hope to accomplish. **This should be original work from each lab partner.**
 - PROCEDURE. Outline what you DID in lab, not what you SHOULD HAVE done. For procedure details you may cut and paste the lab handout, but be sure to note any modifications of the procedure.
 - RAW DATA. Record all data directly into your notebook and never on loose paper. Data should be clearly and neatly labeled.
 - RESULTS. Show sample calculations for all spreadsheets. Label all data tables and graphs clearly, including relevant units. When possible, insert images of all spectra obtained on other instruments.
 - DISCUSSION. This is the section for critical analysis. You can list the main conclusions (full sentences not necessary!) and support them by referring back to specific results. Where appropriate, identify potential sources of error and predict how each would affect your results, and indicate further work that could be done and briefly explain its impact on the study. **This should be original work from each lab partner.**

Short **scientific writing assignments** will be given during the first part of the semester. These assignments will be done in the format required by the journal *Biochemistry* (see the

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journal's "Guidelines for Authors" PDF posted on the blackboard page), will be based on experiments you perform in the laboratory portion of this course, and will be submitted electronically as described by your instructor. Following feedback on the short assignments, you will be asked to write up a **research report** for one of the laboratory experiments in the format of an accelerated publication for *Biochemistry*. Your manuscript should be typed and include all appropriate data in computer-generated figures with suitable legends. Use of the primary literature (scientific journals, NOT web pages) is crucial to set the context of your work. Details and deadlines for this paper will be discussed and posted later in the semester.

BIOL/CHEM 327**TENTATIVE Reading/Lecture/Laboratory Schedule**

| <u>Week of....</u> | <u>Lecture Topic</u> | <u>Chapters in Text</u> | <u>Laboratory</u> |
|-------------------------------|-----------------------------------|--------------------------------|--------------------------|
| 8/31 | Introduction&Water | 1&2 | Pipettors & EXCEL |
| Labor Day – NO CLASS | | | |
| 9/9 | Water, Buffers, Acids/Bases | 2 | Buffers |
| 9/14 | AAs, Peptides, Proteins | 3 | Amino Acids |
| 9/21 | Protein Purification&2° structure | 3, 4 | Amino Acids |
| 9/28 | Protein 2°&3° structure | 4 | Protein Conc. |
| **EXAM#1 – Mon 10/5** | | | |
| 10/7 | Structure methods, Pro Function | 4, 5 | Lysozyme #1 |
| FALL BREAK | | | |
| 10/14 | Globins, Ligand-binding | 5 | Lysozyme #2 |
| 10/19 | Enzymes-Intro&Kinetics | 6 | Lysozyme #3 |
| 10/26 | Enzymes-Inhib/Mech/Reg | 6 | Lysozyme #4 |
| **EXAM#2 – Mon 11/2** | | | |
| 11/4 | Carbohydrates | 7 | Kinetics#1 |
| 11/9 | Carbohydrates | 7 | Kinetics#2 |
| 11/16 | Nucleic Acids | 8 | Kinetics#3 |
| **EXAM#3 – Mon 11/23** | | | |
| THANKSGIVING BRK | | | |
| 11/30 | Lipids | 10 | Carbohydrates |
| 12/7 | Membranes | 11 | |
| **FINAL EXAM – 12/18** | | | |